Chapter 6 Review

1) $P(1,4)$ $Q(3,13)$

$\overrightarrow{PQ} = \langle 3-1, 13-4 \rangle = \boxed{\langle 2, 9 \rangle}$

$|\overrightarrow{PQ}| = \sqrt{(2)^2 + 9^2} = \sqrt{4+81} = \boxed{\sqrt{85}}$

2) $u = \langle -2, -3 \rangle$ $v = \langle -1, -8 \rangle$

$u + v = \langle -2-1, -3-8 \rangle = \boxed{\langle -3, -11 \rangle}$

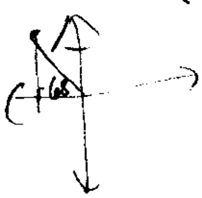
3) $u = \langle 3, 5 \rangle$ unit vector $= \boxed{\left\langle \frac{3}{\sqrt{34}}, \frac{5}{\sqrt{34}} \right\rangle}$

$|u| = \sqrt{3^2 + 5^2} = \sqrt{9+25} = \sqrt{34}$

4) mag. 5 $\theta = 20°$

$\langle 5\cos 20°, 5\sin 20° \rangle = \langle 4.70, 1.71 \rangle$

5) $\langle -5, 13 \rangle$ mag. $= \sqrt{(-5)^2 + (13)^2} = \sqrt{194}$



$\theta = \tan^{-1}\left(\frac{13}{-5}\right) = -68.96° + 180° = 111.04°$

vector is in 2nd Quad.

6) $a \cdot b$ $a = \langle 2, 7 \rangle$ $b = \langle 4, 4 \rangle$

$2 \cdot 4 + 7 \cdot 4 = 8 + 28 = \boxed{36}$

7) angle between $a = \langle -2, -9 \rangle$ $b = \langle -4, -7 \rangle$

$-2 \cdot -4 + -9 \cdot -7 = 8 + 63 = 71$

$\cos\theta = \frac{71}{\sqrt{85} \cdot \sqrt{65}}$

$\theta = \cos^{-1}\left(\frac{71}{\sqrt{85} \cdot \sqrt{65}}\right) = \boxed{17.22°}$

8) $u = \langle 6, 0 \rangle$ $v = \langle 0, -6 \rangle$

$u \cdot v = 6 \cdot 0 + 0 \cdot -6 = 0 + 0 = 0$

$\boxed{\text{orthogonal}}$

9) Eliminate parameter

$x = t + 4$, $y = t^2$

$t = x - 4$ $\boxed{y = (x-4)^2 \text{ or } = x^2 - 8x + 16}$

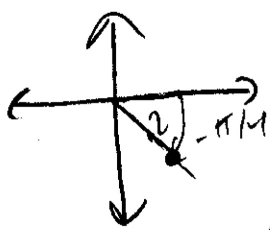
10) Find rectangular coord.

$(-4, 3\pi/2) \rightarrow$ $x = -4\cos 3\pi/2 = -4 \cdot 0 = 0$

$y = -4\sin 3\pi/2 = -4 \cdot -1 = 4$

$\boxed{(0, 4)}$

11) plot $(2, -\pi/4)$



12) $(3, -3)$ two pair of polar coordinates (r, θ) $(0 \le \theta \le 360)$

$r = \sqrt{18} = 3\sqrt{2}$ $(3\sqrt{2}, 315°)$ $(-3\sqrt{2}, 135°)$

13) $r = 10\sin\theta$

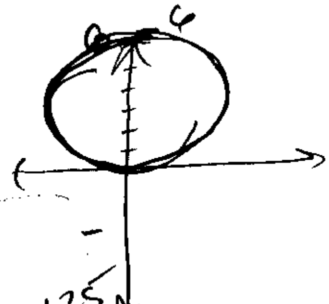
$r^2 = r\,10\sin\theta$

$\boxed{x^2 + y^2 = 10y} = x^2 + y^2 - 10y = 0$

$x^2 + y^2 - 10y + 25 = 0 + 25$

$\boxed{x^2 + (y-5)^2 = 25}$

14) graph $r = 6\sin\theta$



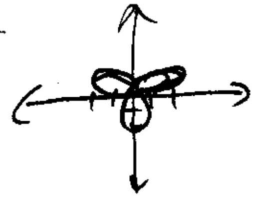
15) $x^2 + y^2 - 4x = 0$

$r^2 - 4r\cos\theta = 0$

$r(r - 4\cos\theta) = 0$

$r = 0$ $r = 4\cos\theta$

16) $r = 2\sin 3\theta$ graph $0 \le \theta \le 2\pi$



17) $z = 2 - 2i$

in trig. form

$r = \sqrt{2^2 + 2^2} = \sqrt{8} = 2\sqrt{2}$

$\theta = \tan^{-1}\left(-\frac{2}{2}\right) = 7\pi/4$

$z = 2\sqrt{2}\left(\cos 7\pi/4 + i \sin 7\pi/4\right)$

18) $z = 8(\cos 30° + i \sin 30°)$

in complex form

$z = 8\left(\frac{\sqrt{3}}{2} + i\frac{1}{2}\right) = \boxed{4\sqrt{3} + 4i}$

19) $z_1 \cdot z_2$

$z_1 = 7(\cos 55° + i \sin 55°)$ $z_2 = 6(\cos 155° + i \sin 155°$

$z_1 z_2 = 7 \cdot 6\left(\cos(55+155) + i \sin(55+155)\right)$

$= 42(\cos 210° + i \sin 210°)$

20) $\frac{9}{6}\left(\cos(170-35) + i \sin(170-35)\right)$

$= \frac{3}{2}(\cos 135 + i \sin 135)$

21) cube root of $27(\cos 285° + i \sin 285°)$

$z_1 = \sqrt[3]{27}\left(\cos \frac{285+0}{3} + i \sin \frac{285+0}{3}\right) = 3(\cos 95° + i \sin 95°)$

$z_2 = 3(\cos 215° + i \sin 215°)$

$z_3 = 3(\cos 335° + i \sin 335°)$

22. $\dfrac{6(\cos 110^\circ + i\sin 110^\circ)}{4(\cos 30^\circ + i\sin 30^\circ)} = \boxed{\dfrac{3}{2}(\cos 80^\circ + i\sin 80^\circ)}$

23. $\dfrac{5(\cos 2\pi + i\sin 2\pi)}{2(\cos\pi + i\sin\pi)} = \dfrac{5}{2}(\cos\pi + i\sin\pi)$

$= \dfrac{5}{2}(-1 + 0i) = -\dfrac{5}{2}$

24. Demoivre's TH. to find $(a+bi)$

$(\cos 35^\circ + i\sin 35^\circ)^4$

$(\cos 4\cdot 35 + i\sin 4\cdot 35^\circ) = \cos 140^\circ + i\sin 140^\circ$

$= -.77 + .64i$

25. Find Fourth roots of

$256(\cos 104^\circ + i\sin 104^\circ)$

$\frac{360}{4} = 90 \quad \sqrt[4]{256} = 4$

$z_1 = 4(\cos 26^\circ + i\sin 26^\circ)$

$z_2 = 4(\cos 116^\circ + i\sin 116^\circ)$

$z_3 = 4(\cos 206^\circ + i\sin 206^\circ)$

$z_4 = 4(\cos 296^\circ + i\sin 296^\circ)$